IMPACT OF HUMAN CAPITAL ON ECONOMIC GROWTH IN AFGHANISTAN

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Introduction

Human capital accumulation is one of the key determinants of economic growth and development for both advanced and developing countries. The contribution of human capital to economic growth has been large and has gradually increased over the last two decades; over the next decade, it is likely to be slightly higher than that experienced over the past decade (Fernandez and Mauro, 2000). Human capital affects economic growth and can help to develop an economy by expanding the knowledge and skills of its people. The level of economic growth driven by consumer spending and business investment determines the amount of skilled labor needed. Therefore, human capital is the main reason for the accelerated growth and expansion of many countries that provide investment in human capital. Furthermore, the human capital consists of the knowledge, skills, and health that people invest in and accumulate throughout their lives, enabling them to realize their potential as productive members of society. Investing in people through nutrition, health care, quality education, jobs, and skills helps develop human capital, and this is key to ending extreme poverty and creating more inclusive societies **(**World Bank Group, 2019) (Group The Human Capital Project, 2019). Despite unprecedented human development gains over the past 25 years, serious challenges remain, especially for developing countries.

No doubt, human capital is one of the fundamental aspects of the economic growth of a country and is broadly defined as the stock. According to Adam Smith, fixed capital has four types involving: land, building, machinery, and human. The current study emphasizes the significance of human capital in the overall development of the country. Adam Smith described human capital as the passage discusses the concept of human capital, highlighting that the skills and abilities acquired by individuals through education, study, or apprenticeship represent an investment of resources. These abilities, like tools or machinery, enhance productivity and contribute to both the individual's wealth and the wealth of society. Despite the initial costs, these investments yield returns over time (Smith, 1776). However, even in the earliest societies, human action was characterized by the existence of knowledge. In different eras, human ability and knowledge have shown their value at their very present moments, whether in the Stone Age, Bronze Age, or Iron Age. Countries and societies are constructed and urbanized by human knowledge, and only human beings can develop new techniques or improve them, and these techniques are gathered in the knowledge bank. This bank helps future societies to grasp evolution and civilization or to ruin empires. During the 11^{th} century, Baghdad city in Iraq was the center of attraction for scientists and philosophers,

and it was also considered the capital of science and knowledge; however, the Mongol empire invaded the city and destroyed books, libraries, and literature.

Afghanistan reached its glory in the region during the 20th century. However, unfortunately, due to civil wars, the country was devastated and lost its physical and human capital due to the cost of war. Further, human capital is explained into five categories: Health facilities and services, on-the-job training, formally organized education at primary, secondary, and tertiary levels, study programs for adults, and migration to individuals and families to adjust to changing job opportunities (Shultz, 1961). In other words, the concept of human capital refers to the abilities and skills of human resources of countries, while human capital formation refers to the process of acquiring and increasing the number of people who have the skills, good health, education, and experience that are critical for economic growth. Thus, investment in education and health is considered a human capital component (Mallik, 2010). Education and health are the two vital pillars in a country, which greatly contributes to economic growth and economic stability by investing in human capital. Theodore Shultz, during a Noble Price speech, stated, "While land per se is not a critical factor in being poor, the human agent is: investment in improving population quality can significantly enhance the economic prospects and the welfare of poor people. Child care, home, and work experience, the acquisition of information and skills through schooling and in other ways consisting primarily of investment in health and schooling, can improve population quality."

Human capital theory treats everyone's state of health as a stock, i.e., as health capital and its contribution to health services. Part of the quality of the initial stock is inherited, and part is acquired. The stock depreciates over time and at an increasing rate in later life. Gross investment in human capital entails acquisition and maintenance costs. These investments include child care, nutrition, clothing, housing, medical services, and the use of one's own time. The flow of services that health capital renders consists of "healthy time" or "sickness-free time," which is input into work, consumption, and leisure activities. Harbison describes those human resources as the ultimate basis for the wealth of a nation and explains that financial capital and natural resources are passive factors of production, and human beings are active agents who utilize these passive resources to build economic, social, and political organizations and promote national development. Against this background, the review of literature related to the research topic entitled "Impact of Human Capital on Economic Growth in Afghanistan" was undertaken as follows;

2. Literature Review

Abbas (2001) compared and examined exogenous growth and human capital in Pakistan and Sri Lanka. The study data set involved World Bank relevant data sources, UNESCO yearbook, United Nations Pacific yearbooks, international labour organization yearbooks and statistical yearbooks, and labor force survey of both countries which carried over the period of 1970-1994. Moreover, the Gross Domestic Product (GDP) is a proxy of economic growth and employment. Gross Domestic Investment as a proxy variable for physical capital and schooling enrolment rate, including higher, secondary, and primary as a proxy variables for human capital, was taken and tested through a slandered growth accounting framework. In addition, the study used regression properties ordinary least squares (OLS) to understand the rate of primary, secondary, and tertiary school enrolment. The study result stipulated that in the short run, human capital investment represented by primary schooling has a negative effect on the economic growth of both countries; however, in the long run, human capital investment embodied by secondary and tertiary schooling has a positive and significant impact on the economic growth of Sri Lanka as well Pakistan. Furthermore, the study merged human capital measures with employment to achieve operational labor input that concluded with positive and effective growth results. Overall, the study found that human capital and physical capital have a positive and significant role in the economic growth of developing countries, including Pakistan and Sri Lanka. Finally, the study suggested policy implications, including focusing on primary education for both countries to enhance economic growth.

Abdalla and Arabi (2013) assessed the impact of human capital on economic growth in Sudan. The study period dating from 1982 to 2009 used a simultaneous equation model to link variables that include school attainment measure of human capital, investment in health and education to economic growth, total productivity, foreign direct investment (FDI), and human development index (HDI). The study data was retrieved from various sources, including UNDP, the Ministry of Finance, the Ministry of Investment, the International Monetary Fund (IMF) yearbook, and the Central Bureau of Statistics. The result of the study indicated that quality of education has a determinant role in economic growth; higher education contributes more to economic growth than secondary education, and also, there was a negative impact of government total expenditure to GDP on the ratio of foreign direct investment to GDP. However, the health quality factors have a positive effect on economic growth.

Ogunrinola and Oluwatobi (2011) have investigated the relationship between government expenditure on human capital development and economic growth in Nigeria. The study mainly focused on government expenditure on health and education and its impact on growth. The study data were collected from secondary sources, including the World Bank, the International Monetary Fund (IMF), the Ministry of Education of Nigeria, and the Ministry of Health of Nigeria. The study has implemented augmented Solow human capital growth model and time series properties consisting of Philip-Peron and Augmented Dickey-Fuller (ADF) unit root tests. In order to understand the stationarity of the data, the study used Johansen co-integration and error correction modeling to examine the long-run relationship between variables. The study result has shown that the physical capital and government expenditure on human capital are positively correlated, and there is a long and positive relationship between human capital and economic growth in Nigeria. Furthermore, the study shed light on the quality of education that can hurt the economic sustainability of the county.

Akpolat (2014) examined the long-run impact of physical and human capital on GDP using data from 13 developed and 11 developing countries from the exact period dated 1979-2010. The study focused on gross fixed capital formation as a physical capital indicator and education and life expectancy as a proxy of human capital. The study implemented Dynamic Ordinary Least Square (DOLS), Fully Modified Ordinary Least Square FMOLS, and an integrated model to find an integration relationship and compare the outcome of physical and human capital variables regarding the data of two different countries' groups. The findings of the study indicated that physical capital investment and education expenditure have a positive impact on the growth of GDP in developed countries in comparison to developing countries based on both models (DOLS and FMOLS). Moreover, the life expectancy at birth was identified as more effective for the growth of GDP in developing countries than in developed countries. Furthermore, the life expectancy at birth in developing countries has made a positive contribution to economic growth in the long run due to retirement policies, and it has proved more efficient in comparison to developed countries.

Babatunde and Adefabi (2015) analyzed the long-run relationship between education and economic growth in Nigeria. The study data were collected from the World Bank Development Indicator (WDI), the Central Bank of Nigeria, and Nigeria's statistical bulletin and annual report for the period 1970 to 2003. The study has mainly focused on human capital from two different aspects, considering human capital as a direct input in the production function, human capital impact on technology parameters, and human capital impact on economic growth. The study used the Cobb-Douglas model to understand the

aspects of productivity and human capital technology. On the other hand, the study implemented a unit root test, co-integration test, and Vector Autoregressive to analyze the stationarity of the data, the co-integrity of the data, and the relationship between variables respectfully. The results of the study indicated that there was a long-run relationship between enrolment in primary school and tertiary school level and average years of schooling with output per worker. In addition, the result has suggested that a well-educated labour force has a strong positive and significant impact on the economic growth of the country through the assessment of total factor productivity. Furthermore, the study shed light on the policy implications of the government, which should focus more on human capital investment in order to create sustainable growth in Nigeria.

Leoning et al. (2010) investigated the economic growth of Guatemala, specifically focusing on schooling results from 1951 to 2002. The study focused on primary, secondary and tertiary education in Guatemala and its impact on the economic growth of the country. Data from the study was retrieved from UNDP, Banco de Guatemala, and the World Bank. The study used a time series attributes unit root test to understand the stationarity of the data, and the study employed an error correction model to examine the long-run and short-run relationship of variables. The results of the study determined that human capital has a significant and positive impact on the economic growth of Guatemala. Moreover, the study indicated the importance of human capital by increasing 1 percentage point years of schooling, which would increase the level of output by 33 percentage points, though primary schooling has a significant impact on the growth of the level of output followed by secondary schooling. Furthermore, the education of the labor force has increased in the country, but the study revealed that in the long run, education of the labor force does not pose any significant improvement regarding the growth of human capital. Finally, the study findings suggested that the physical capital of Guatemala decreased by 20 percent, and this reduction caused slow growth as physical capital and quality of labour could be the key factors in the low output growth rate in the past decade in Guatemala.

Bassanini and Scarpetta (2001) evaluated the human capital growth in OECD countries in an exact timeline dated from 1971-1998. The study collected data from 21 OECD countries, including data from sources like the OECD Analytic Database (ADB), the OECD Statistic Department, and OECD Education. The study used the Cobb-Dougles growth model, which was determined yearly, considering pooled cross-country time series regressions to understand the impact of human capital on economic growth. In addition to the

econometrics approach cross-section regressions, the panel data regressions are used to understand long-run and short-run variables' co-efficiency and correlations. Moreover, the study emphasized education human capital proxy, the growth in real GDP, physical capital proxied by fixed capital formation, and population growth. The results of the study showed that human capital investment has a positive and significant impact on economic growth and a long-run effect on the output of one additional year of education of about 6 percent. Furthermore, the study's results on physical capital showed significant growth in the economy.

Kartal et al. (2017) examined the impact of education and health on the economic growth of Turkey from 1960 to 2011. The study mainly focused on education measured by years of schooling, health measured by life expectancy at birth, and economic growth. The study used the Cobb-Douglas production function in which human capital and physical capital are shown as factors of production. Moreover, the study preferred a time series for the model involving data on education, health, physical capital and labour, and economic growth for the period of 1960-2011.The findings of the study indicated that the human capital first component was found insignificant in most of the data sets except the 1960-1980 data set and the 1981-2001 data set. In the first data set it showed a 5 percent significance level, which means education has a negative impact on economic growth. However, in the second data set, the significance level changed to 1 percent, which means the education impact level changed positively on the economic growth of Turkey. Overall, in the long run, the education component of human capital has a positive and significant impact on economic growth. In addition, health was the second component of human capital found to be partially significant in the first data set, but overall health showed a positive and significant impact on the economic growth of the country. On the other hand, human capital and labour in all data sets found to have significant and positive impact on economic growth.

Ali et al. (2018) examined the human capital relationship and its positiveness in economic growth. The study investigated the data from 132 countries over the period of 1996-2011. The study focused on GDP measures of economic growth, physical capital, and human capital index based on average schooling per year. The study also emphasized on social capabilities proxies, including economic opportunities, and legal system, and property rights. The Cobb-Douglas growth model was implemented by the study to understand the relationship of variables. The study result contributed to the growth literature by identifying the factors that strengthen the relationship between human capital and economic growth. Moreover, the study highlighted a significant interaction of social capabilities and human

capital on economic growth. The study also found that traditional growth models involving only cross-sectional data are not realistic. Finally, it suggests that future research will benefit from the use of panel data that used explicit modeling growth dynamics over time. Hence, the study recommended further studies on this specific channel of the impact of human capital on economic growth.

Robert and Benjamin (1995) undertook a study to examine the impact of human capital and economic growth of Japan for the period of 1952-1993, involving data sources from Japan's statistical yearbook. The study mainly emphasized GDP and human capital proxied by a number of college graduations. The study implemented time series properties such as Vector Autoregressive (VAR) to understand linear interdependency, unite roots tests (URT) to understand the stationarity of the data, Johnsen co-integration to know the relationship among variables, and used Granger causality to determine the optimum number of own and cross-lagged terms. The findings of the study showed that the series of GDP became stationer after the first differencing. However, the result of co-integration revealed that the GDP and human capital are not co-integrated. Therefore, the standard causality Granger test was employed, which showed that the coefficients were statistically significant. Finally, the study result indicated that human capital and economic growth in Japan are affected by a feedback mechanism. It states that if a country to trigger its growth, investment in human capital is an effective answer to attain sustainable and rapid growth.

Usman and Nurudeen (2010) analyzed the effect of government expenditure on Nigeria's economic growth and carried out a disaggregate analysis. The study data focused from 1970-2008 and it was taken into account the relation of Government Total Expenditure (TCAP), Total Recurrent Expenditure (TREC), Government Expenditure on education (EDU), Government expenditure on transport and communication (TRACO), and government expenditure on health (HEL). The study employed co-integration and error correction to examine the relationship between government expenditure and economic growth. The study framework is based on the Keynesian and endogenous growth model, which elaborated as government expenditure accelerates economic growth. The result of the study indicated that jointly, all mentioned variables had a part in the economic growth by approximately 58.97 percent. The study result evidence suggested that expenditure on education, government total capital expenditure, total recurrent expenditure, and government expenditure on education have a negative impact on economic growth while government expenditure on transport and communication and health has a positive impact on the

economic growth of Nigeria. Furthermore, the study recommended that the government should increase its expenditure on transport and communication as well as support the health and education sector through government funding.

Ansari (2015) collected the data from the period of 1966-2014 to empirically examine the role of public formal education on Iran's economic growth in the short and long term. The study focused on public expenditure on education, physical capital, labour, and economic growth. The study used the Auto Regressive Distributed Lag (ARDL) to understand the co-integration relationship between variables, and this method can identify short-term responses among variables as well as present an on-biased estimation of long-term co-efficiency of the data. The study result based on the implemented models and tests has pointed out that in the short-run and long-run impact of labor with public education on the economic growth of Iran is positive as the growth level increased by 0.216 and 0.24 for labour and public education, respectively. However, the impact of education showed a positive relation in economic growth in the short and long term, but the contribution of physical capital is still greater than the impact of human capital during the period. Further, the government should allocate more funds to encourage education sectors in Iran.

Overall, these studies indicated that while human capital investment, particularly in secondary and tertiary education, significantly boosts long-term economic growth, its short-term effects can vary. Health investments consistently show positive impacts, and developed nations tend to benefit more from educational investment, while life expectancy plays a crucial role in developing countries. The findings suggest that policymakers should prioritize long-term investment in education and health to foster sustainable economic growth.

3. Research Gap

Human capital plays an important role in people's development, improving life and income, increasing knowledge, skill, and product capacities, economic growth, and reducing poverty. Some countries are still facing a lack of human capital, including Afghanistan; a good number of studies have been reviewed across the globe. Research studies have analyzed the impact of human capital on economic growth by revealing the different variables broadly categorized into health and education indices. These results provide sufficient empirical support to the view that human capital and the status of economic growth are improving. However, there is a deficiency of studies that empirically verify the impact of human capital on economic growth in the context of Afghanistan. In this background, the present study has attempted to fill this gap. However, scholars across the globe have already empirically

investigated human capital. Considering the research gap in the area of human development and economic growth, this study fails to find the literature related to human capital and economic growth in the context of Afghanistan. Moreover, this study will focus on the inflow of human capital and government initiatives toward human capital. Undertaking this research will be an opportunity to contribute to the economic growth of the country and the Bank of Knowledge. Thus, the following study objectives are set to understand the impact of human capital's selected variables on the economic growth of the country. Furthermore, the study takes into consideration the data from 1980 to 2020.

4. Measurement of Human Capital

The human capital concept has been studied through its various indicators, and many researchers have studied its impact on human capital with the help of its indicators. Hence, this section aims to introduce the approaches that have been taken into consideration in this research.

4.1. ***OUTPUT-BASED:*** This approach is used to measure human capital as stock to know the impact that it has on the economic growth of the country. The researchers have suggested many indicators, such as Barro (1991) and Barro and Lee (1993), which suggested the use of the school enrolment rate as an indicator to measure human capital. Swanson and Dubey (1993) used accumulated years of schooling at the employable age as education attainment. Bloom and Cunning (2000) used education attainment, education graduation, and life expectancy as indicators to measure human capital and its impact on economic growth. Moreover, the United Nations Development Program (1990), which was initiated by Nobel Laureates Mahbub-Ul-Haq and Amartya Sen, introduced the Human Development Index (HDI) and discussed the importance of education indicators, such as years of schooling and literacy rates, and health indicators, such as life expectancy, in assessing human development. Further, the United Nations accepted a novel study using Mean Years of Schooling (MYS) and Expected Years of Schooling (EYS) as the education index and the life expectancy index as the health index.

4.2. ***COST-BASED*****:** This approach highlights the government's investment in health and education and shows the impact of these indicators on economic growth in the country. This approach is also widely incorporated among scholars. In other words, the cost-based approach to human capital emphasizes the return on investment (ROI) by focusing on how expenditures on education, health, and training translate into economic benefits. This

approach considers both direct costs, such as tuition fees and healthcare expenses, and indirect costs, like opportunity costs of forgone wages. Thus, the cost-based approach underscores that strategic investments in human capital not only improve individual well-being but also drive broader economic prosperity. Making it fundamental to sustainable economic policy, many scholars, such as Becker (1964), extensively analyzed the cost and benefits of education and training and emphasized the return on investment from human capital and their impact on economic productivity. Similarly, Mincer (1974) expressed the relationship between earnings, experience, and education and emphasized return on investment (ROI) from human capital. In the same manner, Schultz (1961) explained that investment in human capital is crucial for enhancing productivity and growth. Weil (2009) also added in his research that investment is needed in human capital for sustainable development.

4.3. *CROSS-COUNTRIES*: The cross-country approach to human capital analysis involves comparing various indicators, policies, and outcomes related to human capital across different countries or regions with the same or different economic situations, and many scholars have tested this approach, including Hanushek (2008), Bloom (2004), Behrman (2002) and Heckman (2007).

5. Statement of the Problem

According to Adam Smith, fixed capital, which includes humans, machinery, land, and buildings, can carry a country from a less developing phase to a more developing phase; hence, this study sheds light on human capital and the economic development of Afghanistan. The current study mainly emphasizes the impact of human capital and economic growth in Afghanistan. The first large wave of modern outmigration from Afghanistan, caused by the Soviet invasion in 1979, saw refugees welcomed in the Islamic Republic of Iran and Pakistan, and Afghans continued to flee from conflict across the borders in the following years. The number of refugees spiked in 1990 to more than 6 million. The outflow of migration caused Afghanistan to lose its labour and cadets as well as its education centers; however, after 2001, the formation of a new government in Afghanistan started working on many sectors, including health and education. Between 2002 and 2012, 5.7 million Afghans returned home from different parts of the world, therefore this study looks into human capital assets lost and built throughout the years suffered and nourished by civil wars, regime changes, and policy reforms, and how these changes impacted the growth in the country. Further, It is important to rebuild the nation to remove acute poverty, considerable levels of unemployment, and

high-income inequality, which pushes the country into a deep distress situation. In this background, it is necessary to examine the impact of human capital on economic growth in general and Afghanistan in particular.

6. Objectives of the Study

The thorough verification of the research problem requires specific objectives. Therefore, some of the specific sets for the study are as follows;

- To examine the trends of education and health in Afghanistan.
- To assess the stock of human capital and its impact on economic growth in Afghanistan from 1980 to 2019.
- To analyze investment in health and education and its impact on the economic growth of Afghanistan from 2001 to 2020
- Comparatively analyzing the human capital and economic growth in less developed countries
- To draw comprehensive suggestions and recommendations for policymakers from the results of the study.

7. Hypotheses of the Study

The study has been based on some of the hypotheses. There are as follows;

- H_{01}: Education does not have a positive impact on economic growth in Afghanistan.
- H_{02}: There is a negative short and long-run relationship between human capital indicators, physical capital indicators, and economic growth.
- H_{03}: Government expenditure on health and education has a negative impact on economic growth.
- H_{04}: Human capital indicators do not cause economic growth in the selected less developed countries.
- H_{05}: Life expectancy has a negative impact on the economic growth of Afghanistan

8. Research Methodology

This research intends to analyze the relationship between human capital and economic growth. Analysis is a vital section of research that involves the process of cleaning, shaping, and modeling data to solve an ambiguous issue or discover critical information to make proper decisions. Moreover, the data interpretation is referred to as the pillar of data analysis for making sense of analyzed data and presenting and communicating the result soundly.

Hence, this research has compiled data and run it through different required statistical and mathematical tools and used comprehensive methods to meet a statistically accepted result. The study is empirically divided into three empirical parts. Where the first section analyzes the stock of human capital as the proxies, including the education index and health index, and their impact on the economic growth of Afghanistan, encompassing the period from 1980 to 2019. The second study investigates the impact of human capital investment on the economic growth of Afghanistan, and this part will cover the data from 2001 to 2020. Finally, the third part will discover the impact of human capital on economic growth in selected developing countries. The study methodology is set based on the objectives of the research, and the three parts that are divided are calculated as follows.

8.1 Part One

In this section, the study attempts to understand the impact of human capital indices, which are the education and health indexes, on the economic growth of Afghanistan. The growth is measured by Gross Domestic Products Per Capita and hence incorporates a proper method in order to achieve a robust and stable result. The study employs comprehensive analytic tools based on the nature of the data.

8.1.1: Data:

The data retrieved for this part encompasses from 1980 to 2019 from the following sources: GDP per capita 1980-2002 Macro-trends database, GDP per capita data from 2002 to 2019 is taken from World Bank national accounts data, Human progress.org, NSIA, Missing data of GDP per capita retrieved by formulation (GDP/Population =GDP Per Capita). Education Index (Means year of schooling, expected years of schooling) retrieved from Human progress.org, Statistical yearbook, and ACKU archive. Health Index (Life Expectancy), the World Bank open database. The variables selected for this study are the GDP per capita, the Education Index, and the Health Index.

8.1.2- ANALYSIS:

In this section, the data has been tested based on its nature and behavior through required tests, as the data is in a time series manner and hence, to understand the impact of explanatory variables on the explained variables, the properties of time series have to be employed for the data.

- ***Stationarity***: In time series data, it refers to a property where the statistical characteristics of the series, such as mean, variance, and autocorrelation, remain constant over time. Hence, having this property in data is important because many time series analysis and forecasting methods have the assumption that data should be stationer. Therefore, the study used the Augmented Dickey-Fuller Test (ADF) to account for the presence or absence of unit root or stationarity. Further, to run the unit root test, two key factors (structural break and trends specification) are used to show the data's behavior. These two factors should be considered to avoid spurious results.

In the first part of the study, to understand the problem of structural breaks, the study applied the bi-perron test of multiple structural breaks; the result indicated that multiple breaks were present in the data. Moreover, to remedy the structural break issues, the study used Dummy variables.

To find out the trends specification of the data, the study used two methods: the Augmented Dicky Fuller Stationarity and OLS Ordinary Least Squared, where both the tests indicated the presence of a trend in the data.

The ADF test can be applied to the following equations:

- **Yt is a random walk**: This equation describes a simple random walk model. The value of Y at time t depends solely on the value of Y at time (t-1) plus some random shock (u_t). In this equation, δ represents the coefficient of the lagged Y variable. If δ equals 1, it indicates a unit root, meaning the series is a random walk.

$$Y_t = \delta Y_{t-1} + u_t$$

- **Yt is a Random Walk with drift:** This equation is similar to the first one, but it includes a constant term (β_1) as a drift component. This implies that even without any previous value of Y, the expected value of Y at any time period is β_1. If β_1 is statistically significant and δ equals 1, it suggests the presence of a unit root with drift.

$$Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t$$

- **Yt is a random walk with drift around a stochastic trend:** This equation extends the previous model by including a linear time trend (β_2 t). This means that the drift component is not constant but varies with time. This model allows for the possibility of the trend to change over time in a stochastic manner. If both β_1 and β_2 are statistically significant and δ equals 1, it suggests the presence of a unit root with drift and stochastic trend.

$$Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t$$

- The error term u_t was believed to be uncorrelated while the u_t is associated and correlated; Dickey and Fuller have formulated another test named the Augmented Dickey-Fuller (ADF) test. Therefore, the test is carried out by adding lagged values of the dependent variable to the three equations mentioned earlier and developing an integrated equation. The ADF test is expressed as the following regression (Gujarati, Porter, & Gunasekar, 2009).

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

- After finding out that the data is having trend and structural break, the study employed the structural break Augmented Dicky Fuller test with trend specification.

Further, the result from the stationarity test indicated that the GDP per capita and the health index stationer are at the level of I (0), but the education index signalized at the first difference stationarity level or I (1). Therefore, the variables used in this part of the study have a mixed stationarity level, which are I (0) and I (1).

8.1.4. Autoregressive Distributed Lag (ARDL) model

As per the requirement of data stationarity the suitable method is to understand the long-run relationship and dynamic short-run association is ARDL, where variables are observed repeatedly over a period and have mixed stationarity.

Autoregressive (AR): Captures the relationship between a variable and its own lagged values. ***Distributed Lag*** (DL): DL allows for the examination of the impact of past values of

one variable (or multiple variables) on the current value of another variable. It accounts for the lagged effects of independent variables on the dependent variable the following is the general ARDL model.

To run the ARDL method, the study should take into account for procedures of the method which are

- **Lag Length:** It is important to understand which is optimal for all the variables; therefore, the study runs Vector Auto Regressive (VAR) method to find the optimal lag for the ARDL model. The result evinced from VAR shows that GDP per capita optimal lag is one and independent variables education and health index having two and three optimal lags respectively.

- **Bound Test**: After understanding the value of lags, employing the ARDL bound test with the required lags is recommended for the long-run association. Moreover, the bound test hypothesis suggested three possibilities: if the F-statistic value of the tested variables is more than the upper bound value it shows the presence of a long-run relationship, or if the F-statistic value is less than the lower bound test, it means there is no long run co integration among variables and if the F-statistic value is in between upper and lower bound, the result is inconclusive. Moreover, the findings from the bound test indicated the presence of long run among variables. The bound test is formulated as follows;

$$+ c_2 LnY_{t-1} + c_3 LnHI_{t-1} + c_2 LnEI_{t-1} + \cdots + \lambda_t + e_t \qquad \textbf{(Long run)}$$

- **The Short-run Dynamic:** It is used to understand the relationship among variables in the short run. Therefore, to analyze the short-run dynamic, the study uses the ECM (Error Correction Model) form. The ARDL model incorporates understanding the relationships between variables in both short-run dynamics and long-run. However, the test is unable to capture the adjustment process towards equilibrium after a shock. Hence, the ECM addresses this by employing the error correction term (ECT), which finds out

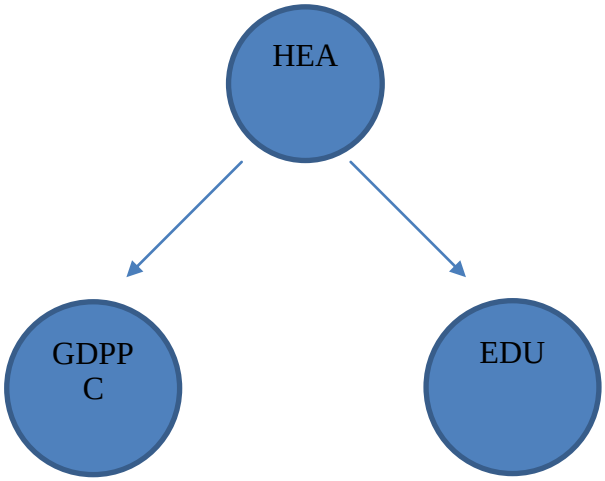
the short-run deviations from equilibrium and the speed of adjustment towards equilibrium. In addition, the short run is formulated as follows.

$$\Delta LnY_t = c_1 + \sum_{j=1}^{p} c_1 \Delta LnY_{t-j} + \sum_{j=0}^{q1} c_2 \Delta LnHI_{t-j} + \sum_{j=0}^{q2} c_3 \Delta LnEI_{t-j}$$ **(Short**

8.1.5: Toda Yamamoto Causality:

A causality test examines whether changes in one variable can predict or cause changes in another. In econometrics, causality tests are essential for understanding relationships between variables and identifying which variable is the cause and which is the effect. Moreover, using causality analysis is essential for understanding cause-and-effect relationships, which is fundamental for making effective decisions and policies. The Toda-Yamamoto causality test is a statistical method used to determine the direction of causality between two or more time-series variables without needing them to be stationary or co-integrated. The Toda-Yamamoto causality test is particularly suited for datasets with mixed integration orders among variables. Further, This test is an extension of the traditional Granger causality test and helps avoid issues related to the integration or co-integration of the series. Unlike the Granger causality test, the Toda-Yamamoto method can be applied even when the variables have different orders of integration (e.g., I(0), I(1), or I(2)). The method involves estimating a Vector Autoregression (VAR) model but with an added step to account for the integration order of the variables. First, the highest order of integration (dmax) is identified across the series. Then, a VAR model is constructed with k + dmax lags, where k is the optimal lag length for the VAR. The final step involves conducting a Wald test on the first k lags to test for causality, disregarding the extra dmax lags. By doing this, the Toda-Yamamoto test minimizes the risk of biased results due to the non-stationary nature of the variables, providing robust inferences about causal relationships between variables. The diagram from the causal relationship between health and education indices and GDP per capita illuminates a one-way causal relationship from the health index to GDP per capita and also from the Health index to the Education index. Moreover, the test result indicated that the education index has a causal relation with the health index toward GDP per capita. it means if the health index increases, the GDP per capita will increase by 15.6 units. Similarly, there is a presence of a causal relationship running from the Health index toward the Education index, which means if the health index increases, the education index increases as well. From the result of chi -sq, the education index increases by 14.4 units. Moreover, jointly, both the Education index and the health index cause GDPPC.

Figure 1: Causality diagram



Source: Computed by Author

8.2-Part Two

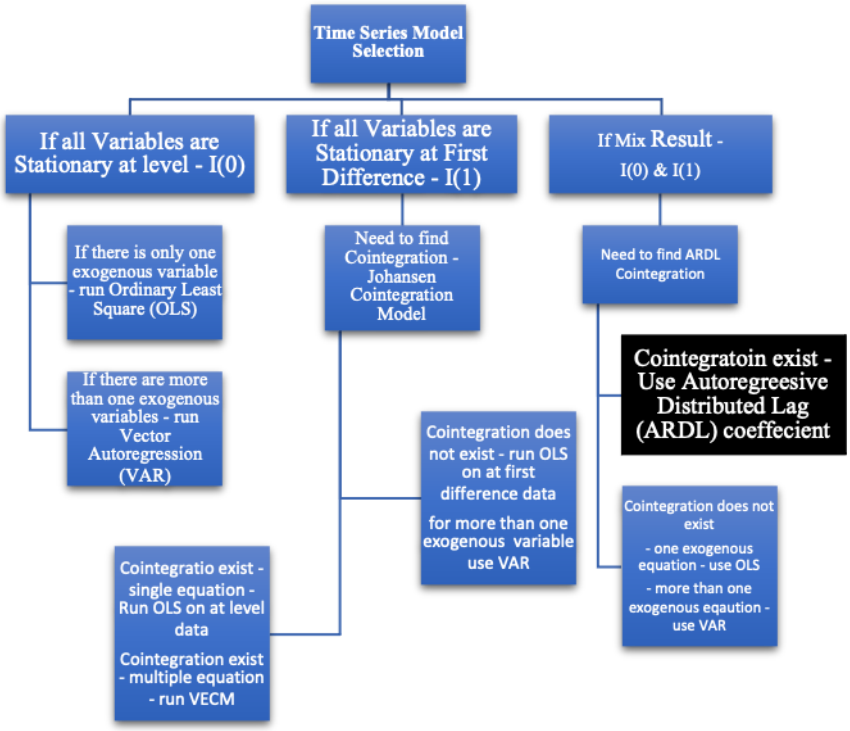
In the second part of the analysis, this study attempts to find the impact of government investment, as well as human and physical capital, on economic growth. In this phase, the study incorporates proxies of human capital formation, including total enrollment and life expectancy, health, and education expenditure. Moreover, the study used gross fixed capital formation as a proxy of physical capital formation and as a dependent variable. The study also used GDP as a proxy for economic growth. In this section, the data considered are from 2001 to 2020.

8.2.1- Data:

The data retrieved for this part encompass from 2001 to 2020 and collected from sources such as GDP 2001 – 2020 is taken from World Bank national accounts data. Government expenditure 2001-2020 World Bank database, Human progress data bank, online and printed statistical yearbooks, ACKU data, and NSIA data. School enrollment 2001-2020 statistical yearbook, NSIA, World Bank open database, and Human progress data. Life expectancy 2001-2020 retrieved from the World Bank open database. Moreover, the variables selected for the study are the Gross Domestic Product, Gross Fixed Capital Formation, Health Expenditure, Education Expenditure, Total school Enrollment, and Life expectancy at birth.

8.2.3- ANALYSIS:

This section focuses on the analysis of data. The methods incorporated are based on the behavioral nature of data. Therefore, the following chart introduces the steps to be taken for the data with time series properties.


Time Series Model Selection
If all Variables are Stationary at level - I(0)
If all Variables are Stationary at First Difference - I(1)
If Mix Result - I(0) & I(1)
If there is only one exogenous variable - run Ordinary Least Square (OLS)
If there are more than one exogenous variables - run Vector Autoregression (VAR)
Need to find Cointegration - Johansen Cointegration Model
Need to find ARDL Cointegration
Cointegratoin exist - Use Autoregreesive Distributed Lag (ARDL) coeffecient
Cointegration does not exist - run OLS on at first difference data
for more than one exogenous variable use VAR
Cointegratio exist - single equation - Run OLS on at level data
Cointegration exist - multiple equation - run VECM
Cointegration does not exist
- one exogenous equation - use OLS
- more than one exogenous eqaution - use VAR

Source: (Shrestha & Bhatta, 2018)

Flow Chart Explanation:

1- When all variables exhibit stationarity at level 1(0) and only one exogenous variable is present, employing Ordinary Least Squares (OLS) is appropriate to analyze the impact among variables.

2- In cases where all variables demonstrate stationarity at level 1(0) and there are multiple exogenous variables, the suitable approach to study their impact is through Vector Autoregression (VAR).

3- If all variables are stationary at the first difference, two possibilities arise from testing co-integration:

- If Johansen's test indicates the presence of one co-integration equation, the research should proceed with employing OLS on the level data.
- If Johansen's co-integration test reveals multiple equations, the recommended method is to use the Vector Error Correction Model (VECM).

- If Johansen's test shows no co-integration equation, the approach involves running OLS for one exogenous variable at the first difference, while for multiple exogenous variables, utilizing VAR is advisable.

4- When dealing with a mixture of stationary variables, some being I (0) and others I (1), the researcher opts for the Autoregressive Distributed Lag (ARDL) co-integration model. Under this circumstance, the following are the potential scenarios:
   - If co-integration is evident, the researcher employs the Autoregressive Distributed Lag (ARDL) coefficients.
   - If co-integration is absent and there is only one exogenous variable, Ordinary Least Squares (OLS) regression is utilized to gauge the effect of independent variables on the dependent variable.
   - If co-integration is absent and there are multiple exogenous variables, a Vector Autoregression (VAR) model becomes a dependable choice.

8.2.4. Unit Root Test:

Unit root tests are statistical procedures used to determine whether a time series is non-stationary and contains a unit root. In other words, its value shows a tendency to follow a random walk, or the shocks in the series have lasting effects, making future value dependent on the past. Therefore, non-stationary data can produce misleading results in time series analysis, and hence, identifying and addressing them is important. Moreover, widely used unit root tests are ADF and Phillips-Perron (PP) tests. These tests evaluate the null hypothesis that the time series has a unit root against the alternate hypothesis that it does not. In this research, the ADF test has been employed, and the test considered that the series is without a structural break and only Gross Fixed Capital Formation (GFCF) showed the presence of a trend in the series. Hence, after applying the ADF test, the variables (Education Expenditure, Health Expenditure, Gross Domestic Products, and Life Expectancy) signalized the stationarity in the level, but gross fixed capital formation and total enrollment level showed the presence of stationarity in the 1^{st} difference.

Autoregressive Distributed Lag (Ardl) Model

The study employed the ARDL test or bounds test to understand the impact of independent variables on dependent variables. This method is useful for examining the existence of long-run relationships between time series variables, and it is favorable for small sample sizes and mixed stationarity variables. The following form is the general ARDL form with lag and variables.

$$\Delta LnY_t = c_1 + c_2 LnY_{t-1} + c_3 LnGFCF_{t-1} + c_4 LnEX_{t-1} + c_5 LnHX_{t-1} + c_6 LnLE_{t-1} + c_7 LnTEN_{t-1} + c_{1,1}\Delta LnY_{t-1} + c_{2,0}\Delta LnGFCF_t + c_{2,1}\Delta LnGFCF_{t-1} + c_{3,0}\Delta LnEX_t + c_{3,1}\Delta LnEX_{t-1} + c_{4,0}\Delta LnHX_t + c_{4,1}\Delta LnHX_{t-1} + c_{5,0}\Delta LnLE_t + c_{5,1}\Delta LnLE_{t-1} + c_{6,0}\Delta LnTEN_t + c_{6,1}\Delta LnTEN_{t-1} + \lambda_t + \varepsilon_{1t}$$

The steps to run the ARDL test are as follows.

- **Leg Length**: Determine the appropriate lag lengths for the ARDL model. This can be done using criteria such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC) through the VAR model.

- Conduct the Bounds Test to determine the existence of a long-run relationship between the variables. The null hypothesis is that there is no long-run relationship (co-integration) among the variables.

    - If the F-statistic from the bounds test is above the upper critical value, reject the null hypothesis (indicating co-integration).
    - If the F-statistic is below the lower critical value, fail to reject the null hypothesis (no co-integration).
    - If the F-statistic falls between the lower and upper critical values, the result is inconclusive.

The following is the ARDL bound test form with the appropriate lags and variables of the study.

$$\Delta LnY_t = c_1 + c_2 LnY_{t-1} + c_3 LnGFCF_t + c_4 LnEX_t + c_5 LnHX_{t-1} + c_6 LnLE_{t-1} + c_7 LnTEN_{t-1} + c_{1,0}\Delta LnHX_t + c_{2,0}\Delta LnLE_t + c_{3,0}\Delta LnTEN_t + \lambda_t + \varepsilon_{1t}$$

The results from the bound test illustrate the presence of long-run relationships among variables as the F-statistic value from the test conducted in EViews 12 is more than the upper bounds test value, and according to the guideline of the bounds test, the study rejects the null hypothesis of no co-integration. Further, life expectancy, health expenditure, and education expenditure are positive and significantly influence GDP, but the gross fixed capital formation and total enrollment of pupils are non-significant in the long run.

***Short Run Dynamic*:** It shows the immediate effects of changes in explanatory variables on the dependent variable. These dynamics are derived from the coefficients of the lagged differences of the explanatory variables in the model. To interprat short-run effects, the ARDL parameter changes into an Error Correction Model (ECM), where the coefficients of the lagged differences (Δ) represent the short-run impacts. The ECM form also includes a speed of adjustment coefficient ECT (-1) reflecting how quickly deviations from the long-run equilibrium are corrected. The short-run coefficients indicate how current and past changes in explanatory variables influence the current value of the dependent variable. Therefore, by examining these coefficients, one can understand the short-term adjustments and immediate impacts within the ARDL framework, distinguishing them from the long-run relationships. The following is the ECT form.

$$\Delta LnY_t = c_1 + c_{2,0}\Delta LnGFCF_t + c_{3,0}\Delta LnEX_t + c_{4,0}\Delta LnHX_t + c_{5,0}\Delta LnLE_t + c_{6,0}\Delta LnTEN_t + \lambda_t + ECT(-1)$$

The result from the dynamic short-run indicates that life expectancy, health expenditure, and education expenditure are positive and significantly influence GDP, but oppositely the Gross fixed capital formation and a total enrollment of pupils are non-significant in the short run.

8.2.5 Granger Causality

Granger causality is a fundamental concept in time series analysis, particularly in econometrics, where it helps to uncover the predictive relationships between variables over time. It was introduced by Granger (1969), earning him a Nobel Prize in Economics. The technique is widely utilized in economics and fields like finance, neuroscience, climatology, and social sciences to investigate if past information on one variable can forecast another. The term "causality" in the context of Granger causality can be somewhat misleading. Unlike traditional notions of causation that imply a direct cause-and-effect relationship, Granger causality is about *predictive causation.* In other words, if a time series X_t is said to "Granger-cause" another time series Y_t, it means that historical data of X_t provides statistically significant information that enhances the prediction of Y_t future values, above and beyond what is possible using only Y_t past value. Therefore, Granger causality captures whether changes in one variable can anticipate changes in another without making any assumptions about the underlying mechanisms driving the relationship. The testing for Granger causality involves a sequence of regression models that compare different specifications to determine if the inclusion of additional variables improves predictive accuracy

8.3. Part Three

In this section, the aim of the research is to comparatively analyze the impact of human capital and physical capital on economic growth in selected Least Developed Countries (LCDs),

8.3.2. Countries: Afghanistan, Bangladesh, Nepal, Kyrgyz Republic, the Democratic Republic of Laos, and Tanzania.

8.3.3. Data

GDP of the countries from 1990 till 2020 World Bank database, Human Progress Data Bank. Education Index of the countries from 1990 till 2020, online and printed statistical yearbooks, Afghanistan Center at Kabul University (ACKU) data, National Statistics and Information Authority **(**NSIA) data of Afghanistan, The Laos PDR statistical system, National Statistic Committee of the Republic of Kyrgyz, National Bureau of Statistic of Tanzania, Bangladesh Bureau of Statistic (BBS), National Statistical Organization of Government of Nepal. Gross fixed capital formation from 1990 till 2020 from the World Bank database and Trading Economics data. Life Expectancy from 1990 till 2020 from the World Bank database. The variables selected are the Gross Domestic product, the Gross Fixed capital formation, the Life expectancy, and the Education Index.

8.3.4. ANALYSIS:

To incorporate the analysis, the study chose education index and life expectancy as the variables to measure Human Capital, and Gross Fixed Capital Formation (GFCF) as the proxies to measure physical capital. Similarly, the Gross Domestic Product is used to measure the growth of the economy. The data used in this section is panel data encompassing from 1990 to 2020 and covering seven countries: Afghanistan, Bangladesh, Nepal, Kyrgyz Republic, Democratic Republic of Laos, and Tanzania. The focus of this analyze is to understand the influence of human capital in these countries. Moreover, the reason for choosing these countries is due to similar economic and data roles, which are vital in the selection. Most of the least developing countries suffered different policy and regime changes, which led to missing data. Hence, these countries were selected comprehensively and thoroughly to allow the data to be collected without any missed value. Further, the data collected is naturally defined as panel data to understand the stationarity and co-integration in the panel data. The nature of the data itself drives the suitable parameter. The data consists of seven countries and thirty years (N=7, T=30); hence, the parameter that the study chose to capture the influence of independent variables on dependent variables in the long run is

Dynamic Ordinary Least Square. The study used panel stationarity and panel co-integration to avoid misleading results.

- ***Panel Stationarity*:** For panel stationarity, there are several methods such as the Levin Lin and Chu Test (2002), Im-Pesaran-Shin (IPS) test (2003), Fisher-Type (ADF and PP) test (1999), the summary of all the above tests showed stationarity at level for the GDP, Life Expectancy, and Education Index, but the GFCF signalized at first difference stationarity level.
- ***Panel Co-integration*:** Given the panel data series after the unit root test, the study employs co-integration to test the existence of co-integration among variables. The Kao (1999) test for co-integration rejects the null hypothesis of no co-integration for the variables.
- ***Panel Causality*:** The Dumitrescu-Hurlin (DH) panel causality test is a statistical method designed to examine causal relationships between variables in panel data, which consists of multiple observations over time for several cross-sectional units. Unlike traditional Granger causality tests, the DH test accommodates heterogeneity across these units, allowing for variations in causal relationships**.** Moreover, the result from DH panel causality indicated that GDP has a bidirectional relationship with GFCF, life expectancy, and education index, but life expectancy has a unidirectional relationship with GFCF.
- ***Dynamic Ordinary Least Square DOLS Test***: The Dynamic Ordinary Least Square or simply DOLS is, developed by Stock and Watson (1993). It is an alternative to Ordinary Least Square that solves the finite sample bias of OLS and also, in the DOLS, the lags and leads introduced to deal with the problems of irrespective orders of integration, existence and absence of co-integration, endogeneity, and serial correlations. The following formula illustrates the general form of DOLS.

$$Y_{it} = \alpha_i + \beta_1 X_t \sum_{k=-p}^{p} \beta_{2i} \Delta X_{it+k} + e_{it}$$

The results from the Dynamic OLS analysis performed using E views 12 indicate a long-term relationship between life expectancy, the education index, and GDP. However, the Gross Fixed Capital Formation (GFCF) is not significantly related to GDP.

9. Significance of the Study

The research is in a time range of 1980 – 2020 and will study human capital with comprehensive and important growth models. The study will focus on education and life health proxies. This period from 1980 to 2020 is considered due to data availability on most of the variables analyzed in the study. The time span that was chosen is due to the revolutionary period of education, from small to large school enrollments. Further, the mortality rate decreased day by day over the study period, and moreover, the data chosen from 2001 to 2020 are the period where most of the migrated Afghans settled back to Afghanistan. The new policies have been established in the education and health sectors.

10. Scope and Limitations of the Study

The present study is undertaken to examine the impact of human capital on Afghanistan's economic growth. It is purposefully selected because it is growing slowly and facing some unique problems compared to any other Islamic country; however, the study is confined to human capital in the form of education and health. Therefore, the scope of the study is confined to these variables. It is a research pursuit undertaken by an individual scholar with limited resources; the study has focused on selected variables of education and health. The hypotheses formulated in this study have been verified by using the secondary data collected from different sources. The researcher has to ensure the data is of better quality to draw reliable inferences. The limitation the study faced in the panel study was that most of the less developed countries were missing huge amounts of data or were not publicly disclosed.

11. Finding of the Study

The major findings in the study are presented as follows from all three parts of analysis;

11.1- Part one

This part of the study is based on the secondary data collected from 1980 to 2019, which means the nature of the data is longitudinal or time series. The first step to undertake in time series data is to understand the stationarity of the data and to find out the proper method the stationarity used in the study is the Augmented Dicky-Fuller (ADF) test with structural break and trend and constant specification. Due to the presence of a trend and structural break in the data.

Natural log has been employed to data in order to mitigate the presence of instabilities such as (Heteroscedasticity, autocorrelation and structural break phenomena). The Perron test can determine the structural break in the data; the presence of a structural break can cause instability; hence, to remedy the problem of structural break, the study used dummy variables.

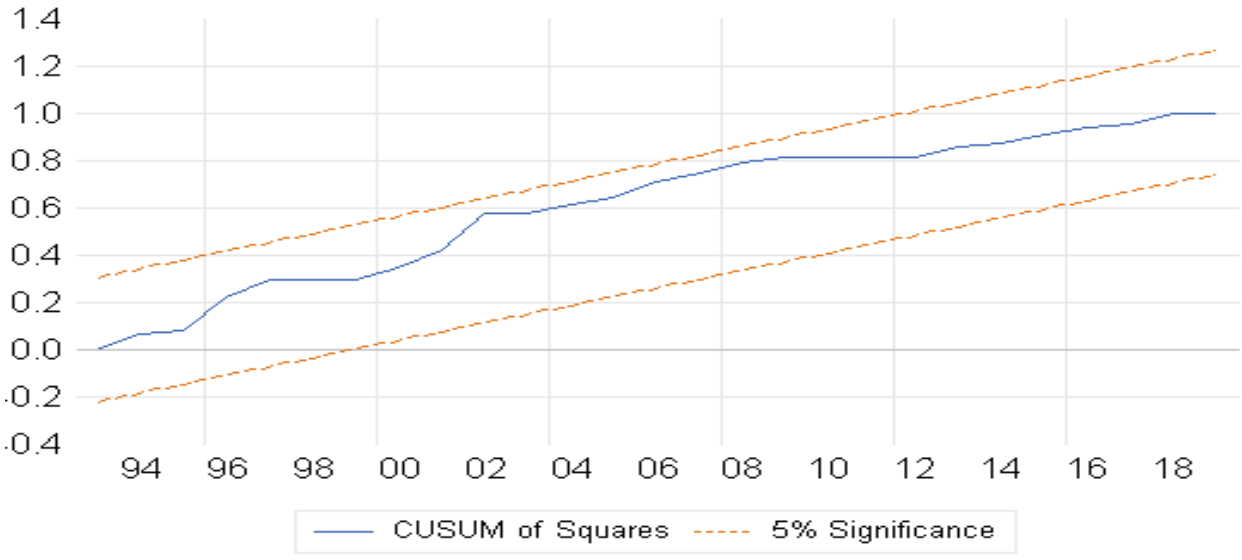
From the result of stationarity, understand that data is in mixed order, which means some data is stationary at the level, and some data is stationary in first difference. Therefore, the study selected the ARDL because the method is suitable for mixed order stationarity; GDP per capita and health index were stationary at the level, and the education index was stationary at the first difference. Furthermore, to investigate the impact of human capital on economic growth using the ARDL model, the first step of the study should select the lag order criteria and find co-integration between variables using a long-run and bound test of ARDL. If the dummy variable is insignificant, it causes the problem of a dummy variables trap, which brings instability to the model; hence, in the ARDL, the presence of dummy variables was insignificant and created collinearity and a dummy variable trap. Hence, it is advised that the dummy variables be removed from the ARDL test.

The first step in running ARDL is to find the optimal lag length as per the ARDL requirements; the vector autoregressive (VAR) is responsible for finding the lag length. Thus, through the test, the study defined the optimum lag length based on the lowest value of lag length. Therefore, the SC Criterion, LR Criterion, Akaike information criterion, HQ Criterion, and FPE selected lag 1 for the dependent variable, and three lags for the exogenous variables is a considerable lag length, and the Akaike Criterion is desirable for running the model. The next step in understanding the long-run relationship of variables is to employ the bound test. The result of the ARDL Co-integration or Bounds test reported a long-run relationship among variables as the bounds test F-statistic value is greater than the upper critical bounds test value. There is a mixture of data based on the stationarity of data, lag length has been selected, and a bound test among variables is used, so the considerable model to find the impact of trade on economic growth is the ARDL coefficient. Moreover, there are five cases in the ARDL for the data with trends or without trends. Therefore, the study specified the suitable trend specification to use case 5 (unrestricted constant and unrestricted trends) in the ARDL test. This case is favorable due to the presence of a trend in the data.

The result evinced from the long-run association that the independent variable Education Index (EDU) has a positive and significant impact on GDPPC (GDP Per Capita). Moreover, it can illustrate that a one-unit increase in the EDU would lead to an increase of 2.6 units in the dependent variable or GDPPC in the long run. Similarly, the HEA (Health index) probability value indicated that the variable has a negative and significant impact on GDPPC. Hence, a one-unit increase in the HEA decreases GDPPC by 7.6 units in the long run. The results from ARDL short run dynamic showed that the ECT is negative and significant with the value of -0.927768 and probability value of 0.000, which means that the dependent variable is adjusting towards equilibrium by 0.92 unit. Moreover, a negative coefficient suggests that GDPPC adjusts by 0.92 units toward its equilibrium after a positive deviation of one unit in the dependent variable. The stability and diagnostic test carried out in EViews 12 showed the absence of heteroscedasticity as the probability value is more than 0.05, which accepts the null hypothesis of Homoscedasticity. Similarly, the test for autocorrelation and ARCH accepted the null hypothesis of no autocorrelations and no ARCH effect, respectively.

The Cumulative sum of the square (COSOMQ) test is to understand whether the result is stable or not. The study used the cumulative sum of the square, and it has to be inside a critical line of 5 percent to show the stability of the model, and the result showed in the below figure is favorable.

Figure 2: Cumulative sum if the square test for Structural break



Source: Computed by author in EViews 12

11.2- Part two

In this section, the study has undertaken to analyze the impact of government expenditure on health and education, total enrolment of pupils, life expectancy and physical capital on the economic growth of Afghanistan. The data was tested for structural break and showed that there was no structural break in the data. Also tested for the trend, only the gross fixed capital variable showed the presence of a trend among variables.

The stationarity was carried out by the test of ADF with the presence of a trend for the gross fixed capital formation variable, which showed the stationary at first difference. Other variables were stationary at level. The ARDL is very suitable to use for mixed stationary integration and small sample sizes. Before testing for the ARDL, the lag length should be specified, where the optimal lag is identified by choosing the smallest value among the lag length criterion provided by the test. This criterion recommends selecting the lag length with the lowest value obtained. In this scenario, the AIC criterion provided the lowest values for both dependent and independent variables, which is one lag. All variables are in natural log form.

The bound test indicated the presence of a long-run relationship between variables as the bound test's F-statistic value is more than the upper bound test's critical value. The result illuminated that expenditure on health and life expectancy is positive and significant at 5 percent and expenditure on education is negative and significant at 5 percent. On the other hand, the impact of gross fixed capital formation and total enrollment level is non-significant. It indicates that a one-unit change in health expenditure will increase economic growth by 2.1 units. Similarly, a one-unit change in life expectancy will increase 23 units in economic growth; however, in the opposite case, a unit change in education expenditure will decrease economic growth by 0.3 units.

From the ARDL short-run dynamic result, it was found that the expenditure on health and life expectancy is positive and significant. Thus, a unit change in health expenditure brings positive changes of about 1.2 units in the GDP. Similarly, a unit change in life expectancy brings a huge change of 7.4 units in the GDP. Further, the expenditure on education is negative but significant at 5 percent with a coefficient of -0.2, which means a unit change in expenditure on education decreases the GDP by 0.2 units. Lastly, the total enrollment level and gross fixed capital formation are not significant.

The diagnostic carried out in the second part of the study is free from the Heteroskedasticity problem, free of the ARCH effect, and no autocorrelations problem. The phenomena of heteroscedasticity refer to a situation in regression analysis where the variability of the error terms (or residuals) is not constant across all levels of the independent variables. When heteroscedasticity is present, it violates one of the assumptions of ordinary least squares (OLS) regression, which assumes that the error terms have constant variance. Moreover, the Autoregressive Conditional Heteroscedasticity (ARCH) refers to a phenomenon in time series data where the variance of the error term or residual is not constant over time but rather varies according to past values of the error term. Durbin-Watson range of 0-4 assumes if the value is near 2, the model is free from autocorrelation.

The Ramsey RESET (Regression Specification Error Test) test is a diagnostic test used to detect potential misspecifications in a regression model. Specifically, it assesses whether the model suffers from omitted variable bias or functional form misspecification. Hence, the model specification test checked by Ramsey RESET pointed out the absence of omitted variables, as the probability value of the test 0.97 is more than the significance value of 5 percent. Therefore, the study accepted the null hypothesis and accepted that the model is correctly specified and the results are robust.

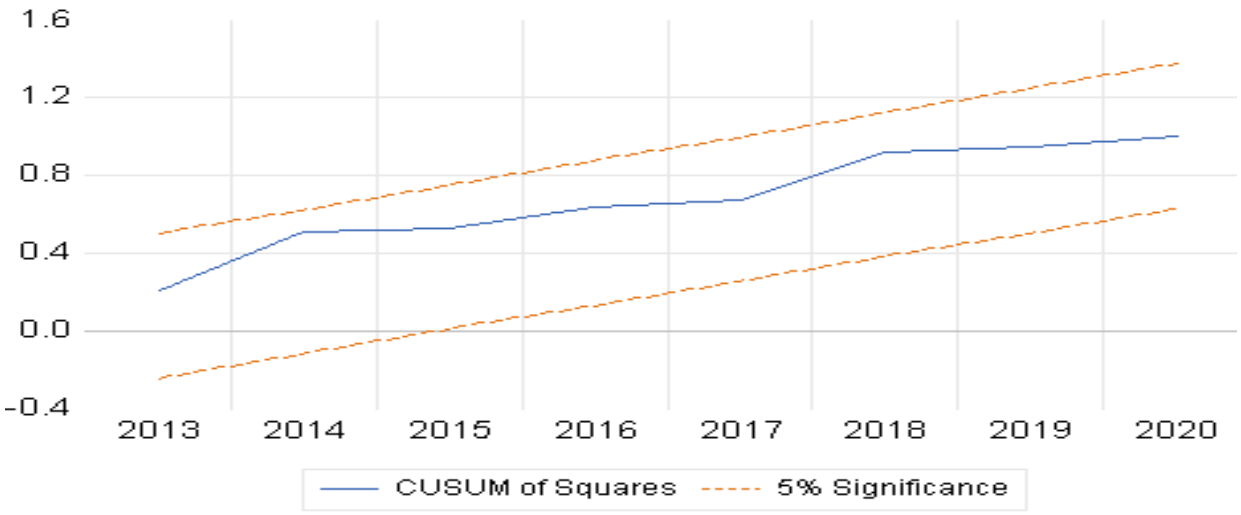
Table 1: Stability and Diagnostic Test Summery

Type of tests	***F-statistics***	***Df***	***Prob.***	***Prob. Chi-Square***
Breusch-Godfrey LM test	2.224494	F (2,6)	0.1893	0.0175
Heteroskedasticity (BPG)	0.837797	F (10,8)	0.6112	0.4655
Heteroskedasticity (ARCH)	0.080655	F (1,16)	0.7801	0.7638
Ramsey RESET test	0.001107	(1,7)	0.9744	
Durbin-Watson test	2.420263			

Source: Computed by author in EViews 12

The final model is stable as the result from the cumulative sum of the square is inside a critical line of 5 percent.

Figure 3: Cumulative sum square test of model Stability



Source: Computed by author in EViews 12

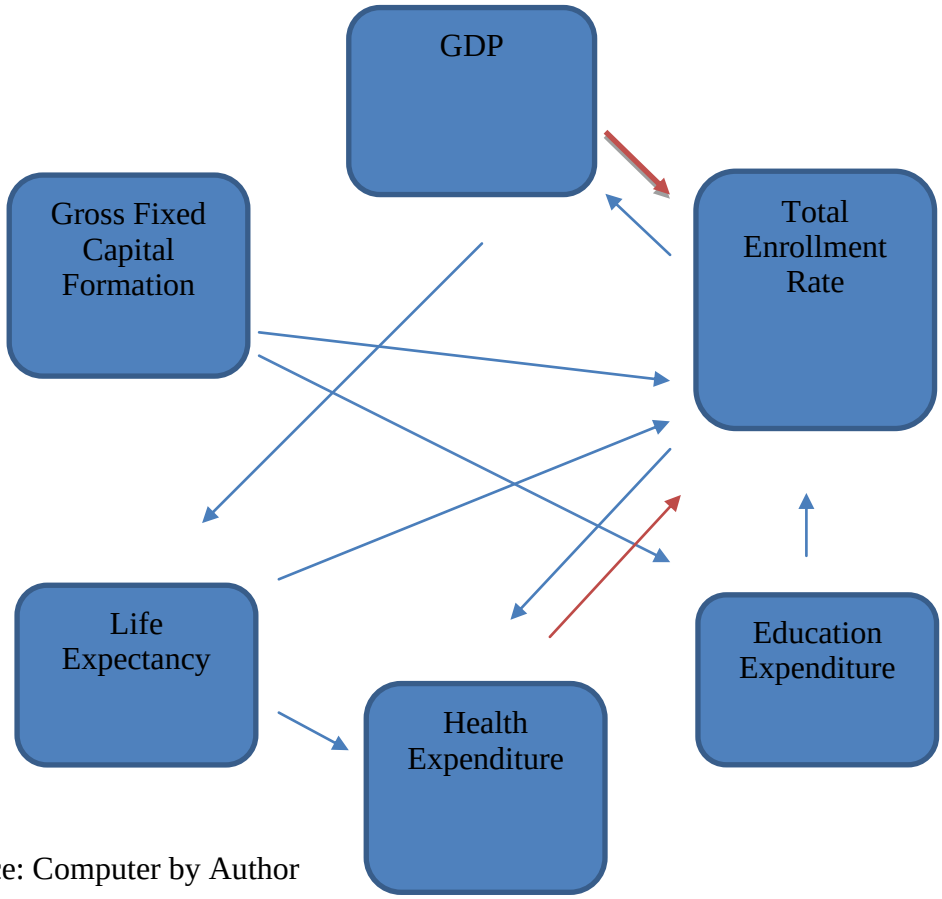
11.2.1 Granger Causality:

Granger causality is a fundamental concept in time series analysis, particularly in econometrics, where it helps to uncover the predictive relationships between variables over time. It was introduced by Granger (1969), earning him a Nobel Prize in Economics. The technique is widely utilized not only in economics but also in fields like finance, neuroscience, climatology, and social sciences to investigate if past information on one variable can forecast another. The term "causality" in the context of Granger causality can be somewhat misleading. Unlike traditional notions of causation that imply a direct cause-and-effect relationship, Granger causality is about *predictive causation.* In other words, if a time series X_t is said to "Granger-cause" another time series Y_t, it means that historical data of X_t provides statistically significant information that enhances the prediction of Y_t future values, above and beyond what is possible using only Y_t past value. Therefore, Granger causality captures whether changes in one variable can anticipate changes in another without making any assumptions about the underlying mechanisms driving the relationship.

From the result in the figure 4 of Granger causality it indicated that there is presence of causal effects. Gross Fixed Capital Formation is having a unidirectional causal relation with education expenditure. Similarly, there is a unidirectional relationship running from education expenditure toward total enrollment rate. Further, there are unidirectional relationship running from GDP toward Life Expectancy, total enrollment rate is causing GDP and GDP is causing total enrollment rate it means it's a bi-directional causal relationship

between GDP and Total enrollment rate, a unidirectional relationship caused from Gross Fixed Capital formation toward total enrollment rate, and the study witnesses a bi-directional causal relationship from total enrollment rate toward health expenditure and vice versa. Finally, from the result of Granger Causality a unidirectional relationship running from Life Expectancy toward health expenditure and also toward total enrollment rate. With the help of diagram, the direction can be comprehensively distinguished. Moreover, all the tables below show the significancy of causal relationship among variables.

Figure 4: Granger Causality Diagram for Variables



Source: Computer by Author

11.3- Part Three

To incorporate the analysis, the study has chosen the education index and life expectancy as the variables to measure Human Capital, Gross Fixed Capital Formation (GFCF) as the proxy to measure physical capital, and, similarly, Gross Domestic Products used to measure the growth in the economy.

The data used in this section is panel data encompassing from 1990 to 2020 and covering seven countries: Afghanistan, Bangladesh, Nepal, Kyrgyz Republic, Democratic Republic of Laos, and Tanzania. To find out the presence of co-integration and association between variables in the long run, the first step is to understand the stationarity of the data. For the panel stationarity, there are several methods such as Levin Lin and Chu test (2002), Im-Pesaran-Shin (IPS) test (2003), Fisher-Type (ADF and PP) test (1999) were used in this study, and calculated test values indicated that only gross fixed capital formation is stationary at 1^{st} difference other variables were stationary at level.

The Kao co-integration test was carried out to find the long-run relationship between variables. The results showed that there is a long-run relationship between variables. The Dynamic Ordinary Least Square, or simply (DOLS) is an alternative to the Ordinary Least Square that solves the finite sample bias of Ordinary Least Square (OLS) and also in the DOLS. The lags and leads introduced to deal with the problems of irrespectively and orders of integration, existence and absence of co-integration, endogeneity, and serial correlations. This parameter shows the long-run effect of variables. Both life expectancy and the education index have a positive and significant long-term relationship with GDP, and both variables have an effect on the GDP in the long run. Specifically, a one-unit increase in life expectancy is associated with a 4.3 unit increase in GDP, and a one-unit increase in the education index corresponds to a 2.7 unit increase in GDP. Oppositely, the gross fixed capital formation showed a non-significant status at 5 percent significance level.

The study used Dumitrescu-Hurlin (DH) panel causality test to examine the causal relationships between variables in panel data. The results from the DH panel's causality indicated that GDP has a bidirectional relationship with GFCF, life expectancy and education index. However, life expectancy has a unidirectional relationship with GFCF, which is running from life expectancy toward GFCF. Similarly, in the case of the education index, there is a unidirectional relationship between GFCF and life expectance, running from the education index toward GFCF and life expectance.

12. Implication and Policy Suggestion

In less developed countries such as Afghanistan, the human force is a vital aspect of its economic growth and development. The country has experienced devastating wars and changes in its regime. With every regime, there was a change in the Afghanistan policies,

which means Afghanistan lacks a concrete policy for health and education. Some of the policies the study suggests are based on the empirical results;

Quality Education: Implementation of teacher development and familiarization of teachers with modern teaching techniques, increasing early childhood enrollment and facilities. ***University Support***: Invest in the development of higher education institutions by improving infrastructure, faculty training, and research facilities. Promote academic freedom and autonomy.

Scholarships: Afghanistan students have been part of many scholarship programs such as ICCR, provided by the Indian government, and the Alama Iqbal Scholarship, which are the major schemes that mainly contribute to higher education, especially for Afghan students. Hence, the government should tie up academically with other countries to provide scholarships, encourage research and innovation by funding research projects and establish partnerships with international universities and research institutions.

Infrastructure: Invest in building and maintaining safe, well-equipped school facilities, especially in rural and conflict-affected areas. Ensure availability of clean water, sanitation, and electricity.

Learning Materials: Provide adequate and up-to-date textbooks, learning materials, and access to technology. Encourage the use of digital resources and e-learning platforms, especially in remote areas.

Girls' Education: Girls' education is affected drastically, creating a safe, gender-sensitive learning environment. Establishing more girls' schools and hiring female teachers to encourage enrollment is vital for the education of the country. The government investment in education should increase, and proper allocation should be maintained. For public expenditure on health to reach sustainable growth in the short run, the government should focus on investing in basic and primary health packages for remote locations, as many rural area populations are facing obstacles to reaching hospitals in city areas.

Health awareness: Launch comprehensive campaigns focusing on key health issues such as hygiene, sanitation, maternal and child health, vaccination, and prevention of infectious diseases like tuberculosis and malaria. Utilize radio, television, and community gatherings. Less developed countries should be robust in data collection and providing those

data for the public to study the policies of countries comprehensively and suggest improvements.

13. Constructive Suggestion for implication

Based on the verification of the impact of human capital on economic growth in Afghanistan, the following suggestions are given below;

13.1. Strengthening Human Capital Development

- The study finds that education and life expectancy positively impact economic growth in the long run. This highlights the need for greater investment in the education and healthcare sectors.
- The positive impact of life expectancy suggests that improving healthcare infrastructure, access to medical facilities, and disease prevention programs will boost economic growth.
- The negative impact of education expenditure on GDP suggests inefficiencies in how education funds are allocated. Policies should focus on improving education quality, reducing dropout rates, and ensuring programs align with labor market needs.

13.2. Healthcare System Enhancement

- Health expenditure positively contributes to economic growth in both the short and long run. Increased public health spending on preventive care, vaccinations, and rural healthcare accessibility can significantly enhance Afghanistan's human capital.
- Since the study found life expectancy significantly increases GDP, policies should prioritize reducing child mortality, improving maternal health, and strengthening public health awareness programs.
- Government interventions should also enhance nutrition programmes and provide clean drinking water, which directly impacts health outcomes and economic productivity.

13.3. Education Sector Reforms

The negative impact of education expenditure on GDP indicates that current spending may not be effective. Reforms should include:

- Enhancing primary and secondary education quality to ensure long-term human capital accumulation.
- Increasing technical and vocational training programs to match labour market demands.

- Encouraging private sector participation to improve education infrastructure and accessibility.

13.4. Capital Formation and Infrastructure Development

- The study suggests that gross fixed capital formation does not significantly impact economic growth, meaning that investments in infrastructure and capital may not be effectively utilized.
- The government should focus on efficient public investment in infrastructure, energy, and transportation sectors to facilitate economic growth.
- Encouraging foreign direct investment (FDI) in infrastructure projects could also help bridge investment gaps.

13.5. Addressing Structural Breaks and Economic Stability

- The study identifies structural breaks in economic data, indicating instability. Policymakers should focus on ensuring economic stability through sound macroeconomic policies, monetary discipline, and fiscal prudence.
- Strengthening institutional frameworks to reduce corruption and inefficiency in public spending will ensure resources are allocated effectively.

13.6. Improving Governance and Policy Implementation

- The study found that dummy variables (representing structural breaks) were insignificant, suggesting institutional inefficiencies.
- The government should work on improving transparency, reducing corruption, and ensuring efficient governance in education and healthcare spending.

14. Future Scope for Study

The study of human capital and economic growth holds significant future potential due to its relevance in understanding how investments in human resources impact economic development. Here are some future scopes and directions.

- Technological Advancement holds a significant position in the development of tools for improving education and health.
- Less developed countries' convergence can create an environment to adapt and copy the education policies in order to bring quality education.
- Less developed countries are changing policies rapidly; hence, with new policies, the opportunity to study them arises.

- ***Long term Implication:*** Education is a time-consuming variable, and there is always a gap to study the effect of it on the economy of the countries, understanding the long-term investment is crucial.

15. Chapter Scheme

The entire research thesis has been presented in six chapters;

The ***first chapter***, Introduction, briefly states the background and extent of human development, provides a statement of the problem, objectives, hypothesis, scope, and limitations of the study, and describes the design of the chapter.

The ***second chapter***, Concepts and Review of Literature deals with the review of the relevant studies in the selected area of research, their methodology, and findings.

The ***third chapter*** gives an explanation of the methodology of the study and elaborates comprehensively on its implications of it.

The ***fourth chapter*** is designed to address the profile of Afghanistan, and it also provides a brief description of the study area along with the human capital and economic growth of the country.

The ***fifth chapter*** is designed to highlight the trend of Afghanistan, and its direction historically.

The ***Sixth Chapters,*** Results and Discussion presents the results of the study, which are discussed with logical interpretations.

In the ***seventh Chapter***, Summary, constructive suggestions, and Conclusion as well as briefly presented the future scope of the study.

Human capital plays a crucial role in driving economic growth, with education and health emerging as key determinants. Across different studies and countries, secondary and tertiary education, along with improved health indicators such as life expectancy, consistently show a positive long-term impact on GDP. While primary education's short-term effects vary, investment in higher education and skill development significantly enhances productivity and

innovation. Similarly, the government spending on health and education, when effectively managed, strengthens economic sustainability. The findings suggest that policymakers should focus on improving education quality, expanding healthcare access, and aligning human capital investments with labour market needs to achieve sustained economic growth.

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Publications

- Published paper on "The Impact of Health Investment on Economic Growth: Empirical Evidence from Afghanistan" in International Journal of All research and scientific methods, Volume 12, Issue 4, April-2024.
- Published paper on "The Nexus of Trade Liberalization and Unemployment in the context of Afghanistan" in American Finance and Banking review, Volume 7, Issue 1, September-2022.

Presented Papers

- Presented a paper on "Analyzing the Nexus between Foreign Trade Human capital and Economic growth in Afghanistan" in the two-day National level Conference on Digital India: Progress, New initiatives, and challenges, Organized by the Department of Studies in Commerce, Mangalore University on 24th and 25th June 2022
- Presented a paper on "Issues and Research Direction of Trade and Unemployment: Evidence from Afghanistan" at International Symposium on Basic IPR and research method Organized virtually on 11th and 12th February 2023 by Srinivas University, Mangalore, India and Azteca University, Mexico in Association with Karnataka State Council for Science and Technology.

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